Complete Summary

GUIDELINE TITLE

Prevention of venous thromboembolism. American College of Chest Physicians evidence-based clinical practice guidelines (8th edition).

BIBLIOGRAPHIC SOURCE(S)

Geerts WH, Bergqvist D, Pineo GF, Heit JA, Samama CM, Lassen MR, Colwell CW. Prevention of venous thromboembolism: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8th Edition). Chest 2008 Jun;133(6 Suppl):381S-453S. [728 references] PubMed

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Geerts WH, Pineo GF, Heit JA, Bergqvist D, Lassen MR, Colwell CW, Ray JG. Prevention of venous thromboembolism: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest 2004 Sep;126(3 Suppl):338S-400S.

** REGULATORY ALERT **

FDA WARNING/REGULATORY ALERT

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- December 3, 2008, Innohep (tinzaparin): The U.S. Food and Drug Administration (FDA) has requested that the labeling for Innohep be revised to better describe overall study results which suggest that, when compared to unfractionated heparin, Innohep increases the risk of death for elderly patients (i.e., 70 years of age and older) with renal insufficiency. Healthcare professionals should consider the use of alternative treatments to Innohep when treating elderly patients over 70 years of age with renal insufficiency and deep vein thrombosis (DVT), pulmonary embolism (PE), or both.
- February 28, 2008, Heparin Sodium Injection: The U.S. Food and Drug Administration (FDA) informed the public that Baxter Healthcare Corporation has voluntarily recalled all of their multi-dose and single-use vials of heparin sodium for injection and their heparin lock flush solutions. Alternate heparin manufacturers are expected to be able to increase heparin production sufficiently to supply the U.S. market. There have been reports of serious adverse events including allergic or hypersensitivity-type reactions, with

symptoms of oral swelling, nausea, vomiting, sweating, shortness of breath, and cases of severe hypotension.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Venous thromboembolism

GUIDELINE CATEGORY

Management
Prevention

CLINICAL SPECIALTY

Anesthesiology
Cardiology
Colon and Rectal Surgery
Critical Care
Emergency Medicine
Family Practice
Geriatrics
Hematology
Internal Medicine
Neurological Surgery
Neurology
Obstetrics and Gynecology
Oncology
Orthopedic Surgery
Physical Medicine and Rehabilitation
Preventive Medicine
Pulmonary Medicine
Radiation Oncology
Surgery

Thoracic Surgery
Urology

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Health Care Providers
Hospitals
Nurses
Patients
Pharmacists
Physicians
Psychologists/Non-physician Behavioral Health Clinicians
Social Workers

GUIDELINE OBJECTIVE(S)

- To review the risks of venous thromboembolism (VTE) in various patient groups
- To discuss the prevention of VTE
- To update evidence-based recommendations for the use of measures to prevent VTE

TARGET POPULATION

- Patients undergoing surgery, such as:
    - General, vascular, gynecologic, urologic, laparoscopic, bariatric, thoracic, and coronary bypass surgery
    - Orthopedic surgery such as elective hip and knee replacement, knee arthroscopy, and hip fracture
    - Isolated lower-extremity injuries distal to the knee
    - Neurosurgery
    - Elective spine surgery
- Patients admitted to the hospital with trauma, spinal cord injury (SCI), lower extremity injuries, or burns
- Medical patients with risk factors for thromboembolism, including:
    - Congestive heart failure
    - Severe respiratory disease
    - Confinement to bed
    - Other medical conditions, such as previous venous thromboembolism (VTE), sepsis, acute neurologic disease, or inflammatory bowel disease
- Cancer patients
- Critical care patients
- Long distance travelers

INTERVENTIONS AND PRACTICES CONSIDERED

Prevention of Venous Thromboembolism (VTE)

1. Assessment of VTE risk and clinical risk factors for VTE

2. Implementation of a written, institution-wide thromboprophylaxis policy
3. The use of strategies shown to increase thromboprophylaxis adherence
    - Computer decision support systems
    - Preprinted orders
    - Periodic audit and feedback Information
4. Passive methods such as distribution of educational materials or educational meetings (not recommended as sole strategies to increase adherence)
5. Nonpharmacologic prophylaxis measures:
    - Early and frequent ambulation or mobilization
    - Mechanical prophylaxis, such as graduated compression stockings (GCS), intermittent pneumatic compression (IPC), or venous foot pumps (VFP)
6. Pharmacologic prophylaxis:
    - Heparin therapy; low-dose unfractionated heparin (LDUH); low-molecular-weight heparin (LMWH); direct thrombin inhibitors; factor Xa inhibitors, such as fondaparinux
    - Adjusted-dose vitamin K antagonist (VKA)
    - Aspirin, dextran (not recommended)
    - Doppler ultrasonography (DUS) screening (recommended only for high risk trauma patients)

MAJOR OUTCOMES CONSIDERED

- Effectiveness of prophylactic strategies for venous thromboembolism (VTE)
- Rates and relative risk of venous thromboembolism outcomes, such as:
    - All-cause mortality
    - Fatal pulmonary embolism (PE)
    - Symptomatic, proven deep vein thrombosis (DVT) or pulmonary embolism
    - Asymptomatic proximal deep vein thrombosis
    - Asymptomatic DVT (proximal and distal)
- Cost effectiveness of prophylaxis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Process of Searching for Evidence

Defining the clinical question provided the framework for formulating eligibility criteria that guided the search for relevant evidence. In specifying eligibility criteria, authors identified not only patients, interventions, and outcomes, but also methodologic criteria. For many recommendations, authors restricted eligibility to randomized controlled trials (RCTs).

For many questions, randomized trials did not provide sufficient data, and chapter authors included observational studies when randomized trials were not the most appropriate design to address the research question. In particular, randomized trials are not necessarily the best design to understand risk groups, that is, the baseline or expected risk of a given event for certain subpopulations.

Identifying the Evidence

To identify the relevant evidence, a team of librarians and research associates at the McMaster University Evidence based practice center (EPC) conducted comprehensive literature searches. Methodologic experts (including the editors) and the EPC librarians reviewed each question to ensure the development of a comprehensive search strategy.

For each question the authors provided, the librarians searched the Cochrane Database of Systematic Reviews, MEDLINE, and Embase for published English-language literature and human studies between 2002 and May 2006. To filter MEDLINE and Embase search results for RCT evidence, the librarians used the search strategy developed by the Cochrane Collaboration. These searches updated the more comprehensive and sensitive searches conducted for the Seventh American College of Chest Physicians (ACCP) Conference on Antithrombotic and Thrombolytic Therapy: Evidence Based Guidelines.

The EPC team conducted separate searches for systematic reviews; RCTs; and, if applicable, observational studies. For observational studies, searches were not restricted in terms of methodology. Although increasing the probability of identifying all published studies, this sensitive approach resulted in large numbers of citations for many of the defined clinical questions. Therefore, trained research assistants screened the citation list developed from the search using criteria of increased specificity to reduce the number of irrelevant citations that the authors received. These irrelevant citations included press news, editorials, narrative reviews, single-case reports, studies that included fewer than 10 subjects per group as an inclusion criterion, animal studies (any nonhuman studies), and letters to the editor. Authors did not include data from abstracts of meetings for the development of recommendations, and the guideline developers did not explicitly use Internet sources to search for research data. Authors were encouraged, however, to mention abstracts that reported on groundbreaking data that were particularly relevant to a specific question in the chapters in order to alert readers that new, fully published evidence might become available shortly.

Standard Consideration of Study Quality

High-quality clinical guidelines should pay careful attention to the methodologic quality of the studies that form the basis of their recommendations. Using the example of the prevention of venous thromboembolism during air travel, Supplemental Table 18 in the online version of the guideline shows the criteria for assessment of study quality (randomization, concealment or treatment allocation, blinding, completeness of follow-up, and whether the analysis was performed according to the intention-to-treat principle), and Table 16 in the online version of the guideline shows the presentation of results that were circulated to the authors. Whereas all authors attended to these criteria, the guideline developers have summarized the results of the quality assessment for only a minority of the

recommendations. Readers can find these summaries in an online appendix to the recommendations (see online supplemental data).

In assessing the quality of observational studies, the guideline developers did not make a distinction between prospective and retrospective because the key issues are unbiased sampling, high-quality measurement of patient characteristics and outcomes, and complete follow-up.

Although it is more likely that these quality criteria will be achieved in prospective studies, prospective studies may fail to achieve them, and retrospective studies may succeed. The guideline developers did make a key distinction about whether internal comparisons exist and their nature. Studies without internal comparisons received the label "case series" unless they met the following criteria: (1) a protocol existed before the date of commencement of data collection; (2) a definition of inclusion and exclusion criteria was available; (3) the study reported the number of excluded patients; (4) the study conducted a standardized follow-up, including description of schedule of follow-up, investigation of suspected outcomes, and criteria used to define outcomes; and (5) the study reported all losses to follow-up.

The guideline developers labeled studies that met these criteria "cohort studies without internal controls." Studies with internal comparisons received the label "cohort studies with concurrent controls" or "cohort studies with historical controls." These cohort studies may succeed or fail to ensure settings, similar time frames, adjustment for differences in patients' characteristics, and follow-up with patients. These features were captured in descriptive tables provided to authors when requested from the EPC.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

The rating scheme framework captures the trade-off between benefits and risks (1 or 2) and the methodological quality of the underlying evidence (A, B, or C). See "Grades of recommendations for antithrombotic agents" in the "Availability of Companion Documents" field and the "Rating Scheme for the Strength of the Recommendations." field.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Summarizing Evidence

The electronic searches also included searches for systematic reviews. If authors were satisfied with a recent high-quality systematic review, evidence from that review provided a foundation for the relevant recommendation.

Pooled analyses from high-quality systematic reviews formed summary data on which panelists based their recommendations wherever possible. Pooling offers the advantage of obtaining more precise estimates of treatment effects and allows for greater generalizability of results. However, pooling also bears the risk of spurious generalization. In general, the summary estimates of interest were the different types of outcomes conveying benefits and downsides (risk, burden, and cost). When pooled estimates of effects were not available, the McMaster University Evidence based practice center (EPC) conducted meta-analysis to obtain pooled estimates for specific questions. These were questions that authors had specifically identified.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Consensus Development Conference)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Group-Specific Recommendations

In general, the guideline developers have endeavored to make their recommendations as specific as possible for patient subgroups differing according to risk. Whenever valid prognostic data were available, the guideline developers used them to estimate absolute effects and made recommendations accordingly. Unfortunately, reliable prognostic indexes are not usually available, limiting the extent to which such group-specific recommendations are possible.

Acknowledge Values and Preferences and Resource Use Underlying Recommendations

Under ideal circumstances, knowledge of average patient values and preferences would be available for every recommendation, the panel members would summarize these values and preferences, and they would be integrated into the recommendations that guideline developers make. The guideline developers asked all chapter chairs before beginning the searches for the relevant literature to identify recommendations that they believed were particularly sensitive to patients' values and preferences. Moderate-quality evidence regarding values and preferences bearing directly on the recommendations proved available for only the chapter that addresses antithrombotic therapy in patients with atrial fibrillation. The panelists bore in mind what average patient values and preferences may be; the process, however, is speculative.

The guideline developer's main strategy for dealing with this unsatisfactory situation is to make the values and preferences underlying the recommendations

explicit whenever the panelists believed that value and preference issues were crucial for a recommendation.

In addition, the guideline developers involved three consultants with expertise in the area of values and preferences to collaborate with the chairs of two chapters and try to ensure that the guidelines adequately represented the views of patients. This collaboration led to extensive discussions among the chapter authors and the consultants and the reflection of these discussions in the associated values and preference statements.

Finalizing and Harmonizing Recommendations

After having completed the steps the guideline developers have described above, the guideline authors formulated draft recommendations before the guidelines review conference, which laid the foundation for authors to work together and critique the recommendations. Figure 1 in the methodology companion (see "Availability of Companion Documents" field) shows the process of guideline development and review. Drafts of chapters that included draft recommendations were usually distributed for peer review to at least two panel members and were always reviewed by at least one panel editor before the conference. Written critiques were prepared and returned to the authors for revision of their work. At the plenary conference, a representative of each chapter presented potentially controversial issues in their recommendations. Chapter authors met to integrate feedback and consider related recommendations in other chapters and to revise their own guidelines accordingly. Authors continued this process after the conference until they reached agreement within their groups and with other author groups who provided critical feedback. The editors of this supplement harmonized the chapters and resolved remaining disagreements between chapters through facilitated discussion. All major correspondence and discussions at the meeting were recorded in written and audio protocols and are publicly available.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Grading Recommendation			
Grade of Recommendation*	**Benefit vs. Risk and Burdens**	**Methodologic Quality of Supporting Evidence**	**Implications**
Strong recommendation, high-quality evidence, Grade 1A	Desirable effects clearly outweigh undesirable effects, or *vice versa*	Consistent evidence from RCTs without important limitations or exceptionally strong evidence from observational studies	Recommendation can apply to most patients in most circumstances; further research is very unlikely to change our confidence in the estimate of effect
Strong recommendation,	Desirable effects	Evidence from RCTs with important	Recommendation can apply to most patients

Grading Recommendation			
Grade of Recommendation*	**Benefit vs. Risk and Burdens**	**Methodologic Quality of Supporting Evidence**	**Implications**
moderate-quality evidence, Grade 1B	clearly outweigh undesirable effects, or *vice versa*	limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence from observational studies	in most circumstances; higher quality research may well have an important impact on our confidence in the estimate of effect and may change the estimate
Strong recommendation, low or very low-quality evidence, Grade 1C	Desirable effects clearly outweigh undesirable effects, or *vice versa*	Evidence for at least one critical outcome from observational studies, case series, or from RCTs with serious flaws or indirect evidence	Recommendation can apply to most patients in many circumstances; higher-quality research is likely to have an important impact on our confidence in the estimate of effect and may well change the estimate
Weak recommendation, high-quality evidence, Grade 2A	Desirable effects closely balanced with undesirable effects	Consistent evidence from RCTs without important limitations or exceptionally strong evidence from observational studies	The best action may differ depending on circumstances or patient or society values; further research is very unlikely to change our confidence in the estimate of effect
Weak recommendation, moderate-quality evidence, Grade 2B	Desirable effects closely balanced with undesirable effects	Evidence from RCTs with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence from observational studies	Best action may differ depending on circumstances or patient or society values; higher-quality research may well have an important impact on our confidence in the estimate of effect and may change the estimate
Weak recommendation, low or very low-quality evidence, Grade 2C	Desirable effects closely balanced with undesirable	Evidence for at least one critical outcome from observational studies, case series, or from RCTs with serious flaws or	Other alternatives may be equally reasonable; higher-quality research is likely to have an important impact on our confidence in the

Grading Recommendation			
Grade of Recommendation*	**Benefit vs. Risk and Burdens**	**Methodologic Quality of Supporting Evidence**	**Implications**
	effects	indirect evidence	estimate of effect and may well change the estimate

*The guideline developers use the wording *recommend* for strong (Grade 1) recommendations and *suggest* for weak (Grade 2) recommendations.

COST ANALYSIS

For these guidelines, the guideline developers implemented recommendations of a recent American College of Chest Physicians (ACCP) task force on integrating resource allocation in clinical practice guidelines by restricting resource expenditure consideration to a small number of recommendations for which they were particularly relevant. The guideline developers relied on two consultants with expertise in economic assessment to help with the process of considering costs in those small numbers of recommendations that the guideline developers considered very important to the decision.

Recommendations highly sensitive to resource allocation now include value and preference statements regarding how cost issues were integrated.

Refer to "Strategies for incorporating resource allocation and economic considerations" (see "Availability of Companion Documents" field) for details of the cost analyses.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The American College of Chest Physicians (ACCP) Health Science Policy (HSP) established a process for the thorough review of all ACCP evidence-based clinical practice guidelines. After final review by the editors, the guidelines underwent review by appropriate NetWorks of the ACCP (for these guidelines, the Cardiovascular and Pulmonary Vascular NetWorks), the HSP, and the Board of Regents. The latter two have the right of approval or disapproval but usually work with the guideline authors and editors to make necessary revisions before final approval. Each group identified primary reviewers who read the full set of chapters as well as individual committee members who were responsible for reviewing one or more chapters. The reviewers considered both content and methodology as well as whether there was balanced, not biased, reporting and adherence to HSP processes. Finally, the *CHEST* editor-in-chief read and

forwarded the manuscripts for nonbiased, independent, external peer review before acceptance for publication.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The grades of recommendation (1A, 1B, 1C, 2A, 2B, 2C) are defined at the end of the "Major Recommendations" field.

General Recommendations

Hospital Thromboprophylaxis Policy

1. For every general hospital, the guideline developers recommend that a formal, active strategy that addresses the prevention of venous thromboembolism (VTE) be developed **(Grade 1A)**.
2. The guideline developers recommend that the local thromboprophylaxis strategy be in the form of a written, institution-wide thromboprophylaxis policy **(Grade 1C)**.
3. The guideline developers recommend the use of strategies shown to increase thromboprophylaxis adherence, including the use of computer decision support systems **(Grade 1A)**, preprinted orders **(Grade 1B)**, and periodic audit and feedback **(Grade 1C)**. Passive methods such as distribution of educational materials or educational meetings are not recommended as sole strategies to increase adherence to thromboprophylaxis (**Grade 1B)**.

Mechanical Methods of Thromboprophylaxis

1. The guideline developers recommend that mechanical methods of thromboprophylaxis be used primarily in patients at high risk of bleeding **(Grade 1A)**, or possibly as an adjunct to anticoagulant-based thromboprophylaxis **(Grade 2A)**.
2. For patients receiving mechanical methods of thromboprophylaxis, the guideline developers recommend that careful attention be directed toward ensuring the proper use of, and optimal adherence with, these methods **(Grade 1A)**.

Aspirin as Thromboprophylaxis

The guideline developers recommend against the use of aspirin alone as thromboprophylaxis against VTE for any patient group **(Grade 1A)**.

Anticoagulant Dosing

For each of the antithrombotic agents, the guideline developers recommend that clinicians follow manufacturer-suggested dosing guidelines **(Grade 1C)**.

Renal Impairment and Anticoagulant Dosing

The guideline developers recommend that renal function be considered when making decisions about the use and/or the dose of low-molecular-weight heparin (LMWH), fondaparinux, and other antithrombotic drugs that are cleared by the kidneys, particularly in elderly patients, patients with diabetes mellitus, and those at high risk for bleeding **(Grade 1A)**. Depending on the circumstances, the guideline developers recommend one of the following options in this situation: avoiding the use of an anticoagulant that bioaccumulates in the presence of renal impairment, using a lower dose of the agent, or monitoring the drug level or its anticoagulant effect **(Grade 1B)**.

Antithrombotic Drugs and Neuraxial Anesthesia/Analgesia or Peripheral Nerve Blocks

1. For all patients undergoing neuraxial anesthesia or analgesia, the guideline developers recommend appropriate patient selection and caution when using anticoagulant thromboprophylaxis **(Grade 1A)**.
2. For patients receiving deep peripheral nerve blocks, the guideline developers recommend that the same cautions considered for neuraxial techniques be applied when using anticoagulant thromboprophylaxis **(Grade 1C)**.

General, Vascular, Gynecologic, Urologic, Laparoscopic, Bariatric, Thoracic, and Coronary Artery Bypass Surgery (CABG) Surgery

General Surgery

1. For low-risk general surgery patients who are undergoing minor procedures and have no additional thromboembolic risk factors, the guideline developers recommend against the use of specific thromboprophylaxis other than early and frequent ambulation **(Grade 1A)**.
2. For moderate-risk general surgery patients who are undergoing a major procedure for benign disease, the guideline developers recommend thromboprophylaxis with LMWH, low-dose UFH (LDUH), or fondaparinux **(each Grade 1A)**.
3. For higher-risk general surgery patients who are undergoing a major procedure for cancer, the guideline developers recommend thromboprophylaxis with LMWH, LDUH three times daily, or fondaparinux **(each Grade 1A)**.
4. For general surgery patients with multiple risk factors for VTE who are thought to be at particularly high risk, the guideline developers recommend that a pharmacologic method (i.e., LMWH, LDUH three times daily, or fondaparinux) be combined with the optimal use of a mechanical method (i.e., graduated compression stockings [GCS] and/or intermittent pneumatic compression [IPC]) **(Grade 1C)**.
5. For general surgery patients with a high risk of bleeding, the guideline developers recommend the optimal use of mechanical thromboprophylaxis with properly fitted GCS or intermittent pneumatic compression (IPC) **(Grade 1A)**. When the high bleeding risk decreases, the guideline developers recommend that pharmacologic thromboprophylaxis be substituted for or added to the mechanical thromboprophylaxis **(Grade 1C)**.
6. For patients undergoing major general surgical procedures, the guideline developers recommend that thromboprophylaxis continue until discharge from hospital **(Grade 1A)**. For selected high-risk general surgery patients,

including some of those who have undergone major cancer surgery or have previously had VTE, we suggest that continuing thromboprophylaxis after hospital discharge with LMWH for up to 28 days be considered **(Grade 2A)**.

Vascular Surgery

1. For patients undergoing vascular surgery, who do not have additional thromboembolic risk factors, the guideline developers suggest that clinicians not routinely use specific thromboprophylaxis other than early and frequent ambulation **(Grade 2B)**.
2. For patients undergoing major vascular surgery procedures who have additional thromboembolic risk factors, the guideline developers recommend thromboprophylaxis with LMWH, LDUH, or fondaparinux **(Grade 1C)**.

Gynecologic Surgery

1. For low-risk gynecologic surgery patients who are undergoing minor procedures and have no additional risk factors, the guideline developers recommend against the use of specific thromboprophylaxis other than early and frequent ambulation **(Grade 1A)**.
2. For gynecology patients undergoing entirely laparoscopic procedures, the guideline developers recommend against routine thromboprophylaxis, other than early and frequent ambulation **(Grade 1B)**.
3. For gynecology patients undergoing entirely laparoscopic procedures in whom additional VTE risk factors are present, the guideline developers recommend the use of thromboprophylaxis with one or more of LMWH, LDUH, IPC, or GCS **(Grade 1C)**.
4. For all patients undergoing major gynecologic surgery, the guideline developers recommend that thromboprophylaxis be used routinely **(Grade 1A)**.
5. For patients undergoing major gynecologic surgery for benign disease, without additional risk factors, the guideline developers recommend LMWH **(Grade 1A)**, LDUH **(Grade 1A)**, or IPC started just before surgery and used continuously while the patient is not ambulating **(Grade 1B)**.
6. For patients undergoing extensive surgery for malignancy, and for patients with additional VTE risk factors, the guideline developers recommend routine thromboprophylaxis with LMWH (Grade 1A), or LDUH three times daily (**Grade 1A)**, or IPC, started just before surgery and used continuously while the patient is not ambulating **(Grade 1A)**. Alternative considerations include a combination of LMWH or LDUH plus mechanical thromboprophylaxis with GCS or IPC, or fondaparinux **(all Grade 1C)**.
7. For patients undergoing major gynecologic procedures, the guideline developers recommend that thromboprophylaxis continue until discharge from hospital **(Grade 1A)**. For selected high-risk gynecology patients, including some of those who have undergone major cancer surgery or have previously had VTE, the guideline developers suggest that continuing thromboprophylaxis after hospital discharge with LMWH for up to 28 days be considered **(Grade 2C)**.

Urologic Surgery

1. For patients undergoing transurethral or other low-risk urologic procedures, the guideline developers recommend against the use of specific thromboprophylaxis other than early and frequent ambulation **(Grade 1A)**.
2. For all patients undergoing major, open urologic procedures, the guideline developers recommend that thromboprophylaxis be used routinely **(Grade 1A)**.
3. For patients undergoing major, open urologic procedures, the guideline developers recommend routine thromboprophylaxis with LDUH twice daily or three times daily **(Grade 1B)**, GCS, and/or IPC started just before surgery and used continuously while the patient is not ambulating **(Grade 1B)**, LMWH **(Grade 1C)**, fondaparinux **(Grade 1C)**, or the combination of a pharmacologic method (i.e., LMWH, LDUH, or fondaparinux) with the optimal use of a mechanical method (i.e., GCS and/or IPC) **(Grade 1C)**.
4. For urologic surgery patients who are actively bleeding, or who are at very high risk for bleeding, the guideline developers recommend the optimal use of mechanical thromboprophylaxis with GCS and/or IPC at least until the bleeding risk decreases **(Grade 1A)**. When the high bleeding risk decreases, the guideline developers recommend that pharmacologic thromboprophylaxis be substituted for or added to the mechanical thromboprophylaxis **(Grade 1C)**.

Laparoscopic Surgery

1. For patients undergoing entirely laparoscopic procedures who do not have additional thromboembolic risk factors, the guideline developers recommend against the routine use of thromboprophylaxis, other than early and frequent ambulation **(Grade 1B)**.
2. For patients undergoing laparoscopic procedures, in whom additional VTE risk factors are present, the guideline developers recommend the use of thromboprophylaxis with one or more of LMWH, LDUH, fondaparinux, IPC, or GCS **(all Grade 1C)**.

Bariatric Surgery

1. For patients undergoing inpatient bariatric surgery, the guideline developers recommend routine thromboprophylaxis with LMWH, LDUH three times daily, fondaparinux, or the combination of one of these pharmacologic methods with optimally used IPC **(each Grade 1C)**.
2. For patients undergoing inpatient bariatric surgery, the guideline developers suggest that higher doses of LMWH or LDUH than usual for nonobese patients be used **(Grade 2C)**.

Thoracic Surgery

1. For patients undergoing major thoracic surgery, the guideline developers recommend routine thromboprophylaxis with LMWH, LDUH, or fondaparinux **(each Grade 1C)**.
2. For thoracic surgery patients with a high risk of bleeding, the guideline developers recommend the optimal use of mechanical thromboprophylaxis with properly fitted GCS and/or IPC **(Grade 1C)**.

Coronary Artery Bypass (CABG) Surgery

1. For patients undergoing CABG, the guideline developers recommend the use of thromboprophylaxis with LMWH, LDUH, or optimally used bilateral GCS or IPC **(Grade 1C)**.
2. For patients undergoing CABG, the guideline developers suggest the use of LMWH over LDUH **(Grade 2B)**.
3. For patients undergoing CABG with a high risk of bleeding, we recommend the optimal use of mechanical thromboprophylaxis with properly fitted bilateral GCS or IPC **(Grade 1C)**.

Orthopedic Surgery

Elective Hip Replacement

1. For patients undergoing elective total hip replacement (THR), the guideline developers recommend the routine use of one of the following anticoagulant options: (1) LMWH (at a usual high-risk dose, started 12 hours before surgery or 12 to 24 hours after surgery, or 4 to 6 hours after surgery at half the usual high-risk dose and then increasing to the usual high-risk dose the following day); (2) fondaparinux (2.5 mg started 6 to 24 hours after surgery); or (3) adjusted-dose vitamin K antagonist (VKA) started preoperatively or the evening of the surgical day (international normalized ratio [INR] target, 2.5; INR range, 2.0 to 3.0) **(all Grade 1A)**.
2. For patients undergoing THR, the guideline developers recommended against the use of any of the following: aspirin, dextran, LDUH, GCS, or venous foot pump (VFP) as the sole method of thromboprophylaxis **(all Grade 1A)**.
3. For patients undergoing THR who have a high risk of bleeding, the guideline developers recommend the optimal use of mechanical thromboprophylaxis with the VFP or IPC **(Grade 1A)**. When the high bleeding risk decreases, the guideline developers recommend that pharmacologic thromboprophylaxis be substituted for or added to the mechanical thromboprophylaxis **(Grade 1C)**.

Elective Knee Replacement

1. For patients undergoing total knee replacement (TKR), the guideline developers recommend routine thromboprophylaxis using LMWH (at the usual high-risk dose), fondaparinux, or adjusted-dose VKA INR target, 2.5; INR range, 2.0 to 3.0) **(all Grade 1A)**.
2. For patients undergoing TKR, the optimal use of IPC is an alternative option to anticoagulant thromboprophylaxis **(Grade 1B)**.
3. For patients undergoing TKR, the guideline developers recommend against the use of any of the following as the only method of thromboprophylaxis: aspirin **(Grade 1A)**, LDUH **(Grade 1A)**, or venous foot pump (VFP) **(Grade 1B)**.
4. For patients undergoing TKR who have a high risk of bleeding, the guideline developers recommend the optimal use of mechanical thromboprophylaxis with IPC **(Grade 1A)** or VFP **(Grade 1B)**. When the high bleeding risk decreases, the guideline developers recommend that pharmacologic thromboprophylaxis be substituted for or added to the mechanical thromboprophylaxis **(Grade 1C)**.

Knee Arthroscopy

1. For patients undergoing knee arthroscopy who do not have additional thromboembolic risk factors, the guideline developers suggest that clinicians not routinely use thromboprophylaxis other than early mobilization **(Grade 2B)**.
2. For patients undergoing arthroscopic knee surgery who have additional thromboembolic risk factors or following a complicated procedure, the guideline developers recommend thromboprophylaxis with LMWH **(Grade 1B)**.

Hip Fracture Surgery

1. For patients undergoing hip fracture surgery (HFS), the guideline developers recommend routine thromboprophylaxis using fondaparinux **(Grade 1A)**, LMWH **(Grade 1B)**, adjusted-dose VKA (INR target, 2.5; INR range, 2.0 to 3.0) **(Grade 1B)**, or LDUH **(Grade 1B)**.
2. For patients undergoing HFS, the guideline developers recommend against the use of aspirin alone **(Grade 1A)**.
3. For patients undergoing HFS in whom surgery is likely to be delayed, the guideline developers recommend that thromboprophylaxis with LMWH or LDUH be initiated during the time between hospital admission and surgery **(Grade 1C)**.
4. For patients undergoing HFS who have a high risk of bleeding, the guideline developers recommend the optimal use of mechanical thromboprophylaxis **(Grade 1A)**. When the high bleeding risk decreases, the guideline developers recommend that pharmacologic thromboprophylaxis be substituted for or added to the mechanical thromboprophylaxis **(Grade 1C)**.

Other Thromboprophylaxis Issues in Major Orthopedic Surgery

Commencement of Thromboprophylaxis

1. For patients receiving LMWH as thromboprophylaxis in major orthopedic surgery, the guideline developers recommend starting either preoperatively or postoperatively **(Grade 1A)**.
2. For patients receiving fondaparinux as thromboprophylaxis in major orthopedic surgery, the guideline developers recommend starting either 6 to 8 hours after surgery or the next day **(Grade 1A)**.

Screening for Deep Vein Thrombosis (DVT) Before Hospital Discharge

For asymptomatic patients following major orthopedic surgery, the guideline developers recommend against the routine use of Doppler ultrasonography (DUS) screening before hospital discharge **(Grade 1A)**.

Duration of Thromboprophylaxis

1. For patients undergoing THR, TKR, or HFS, the guideline developers recommend thromboprophylaxis with one of the recommended options for at least 10 days **(Grade 1A)**.
2. For patients undergoing THR, the guideline developers recommend that thromboprophylaxis be extended beyond 10 days and up to 35 days after

surgery **(Grade 1A)**. The recommended options for extended thromboprophylaxis in THR include LMWH **(Grade 1A)**, a VKA **(Grade 1B)**, or fondaparinux **(Grade 1C)**.
3. For patients undergoing TKR, the guideline developers suggest that thromboprophylaxis be extended beyond 10 days and up to 35 days after surgery **(Grade 2B)**. The recommended options for extended thromboprophylaxis in TKR include LMWH **(Grade 1C)**, a VKA **(Grade 1C)**, or fondaparinux **(Grade 1C)**.
4. For patients undergoing HFS, the guideline developers recommend that thromboprophylaxis be extended beyond 10 days and up to 35 days after surgery **(Grade 1A)**. The recommended options for extended thromboprophylaxis in HFS include fondaparinux **(Grade 1A)**, LMWH **(Grade 1C)**, or a VKA **(Grade 1C)**.

Elective Spine Surgery

1. For patients undergoing spine surgery who do not have additional thromboembolic risk factors, the guideline developers suggest that clinicians not routinely use specific thromboprophylaxis other than early and frequent ambulation **(Grade 2C)**.
2. For patients undergoing spine surgery who have additional thromboembolic risk factors, such as advanced age, malignancy, presence of a neurologic deficit, previous VTE, or an anterior surgical approach, the guideline developers recommend that one of the following thromboprophylaxis options be used: postoperative LDUH **(Grade 1B)**, postoperative LMWH **(Grade 1B)**, or optimal use of perioperative IPC **(Grade 1B)**. An alternative consideration is GCS **(Grade 2B)**.
3. For patients undergoing spine surgery who have multiple risk factors for VTE, the guideline developers suggest that a pharmacologic method (i.e., LDUH or LMWH) be combined with the optimal use of a mechanical method (i.e., GCS and/or IPC) **(Grade 2C)**.

Isolated Lower-Extremity Injuries Distal to the Knee

For patients with isolated lower-extremity injuries distal to the knee, the guideline developers suggest that clinicians not routinely use thromboprophylaxis **(Grade 2A)**.

Neurosurgery

1. For patients undergoing major neurosurgery, the guideline developers recommend that thromboprophylaxis be used routinely **(Grade 1A)**, with optimal use of IPC **(Grade 1A)**. Acceptable alternatives to IPC are postoperative LMWH **(Grade 2A)** or LDUH **(Grade 2B)**.
2. For patients undergoing major neurosurgery who have a particularly high thrombosis risk, the guideline developers suggest that a mechanical method (i.e., GCS and/or IPC) be combined with a pharmacologic method (i.e., postoperative LMWH or LDUH) **(Grade 2B)**.

Trauma, Spinal Cord Injury, Burns

Trauma

1. For all major trauma patients, the guideline developers recommend routine thromboprophylaxis, if possible **(Grade 1A)**.
2. For major trauma patients, in the absence of a major contraindication, the guideline developers recommend that clinicians use LMWH thromboprophylaxis starting as soon as it is considered safe to do so **(Grade 1A)**. An acceptable alternative is the combination of LMWH and the optimal use of a mechanical method of thromboprophylaxis **(Grade 1B)**.
3. For major trauma patients, if LMWH thromboprophylaxis is contraindicated due to active bleeding or high risk for clinically important bleeding, the guideline developers recommend that mechanical thromboprophylaxis with IPC, or possibly with GCS alone be used **(Grade 1B)**. When the high bleeding risk decreases, the guideline developers recommend that pharmacologic thromboprophylaxis be substituted for or added to the mechanical thromboprophylaxis **(Grade 1C)**.
4. In trauma patients, the guideline developers recommend against routine DUS screening for asymptomatic DVT **(Grade 1B)**. The guideline developers do recommend DUS screening in patients who are at high risk for VTE (e.g., in the presence of a spinal cord injury [SCI], lower-extremity or pelvic fracture, or major head injury) and who have received suboptimal thromboprophylaxis or no thromboprophylaxis **(Grade 1C)**.
5. For trauma patients, the guideline developers recommend against the use of an inferior vena cava filter as thromboprophylaxis **(Grade 1C)**.
6. For major trauma patients, the guideline developers recommend the continuation of thromboprophylaxis until hospital discharge **(Grade 1C)**. For trauma patients with impaired mobility who undergo inpatient rehabilitation, the guideline developers suggest continuing thromboprophylaxis with LMWH or a VKA (target INR, 2.5; range, 2.0 to 3.0) **(Grade 2C)**.

Acute Spinal Cord injury (SCI)

1. For all patients with acute SCI, the guideline developers recommend that routine thromboprophylaxis be provided **(Grade 1A)**.
2. For patients with acute SCI, the guideline developers recommend thromboprophylaxis with LMWH, commenced once primary hemostasis is evident **(Grade 1B)**. Alternatives include the combined use of IPC and either LDUH **(Grade 1B)** or LWMH **(Grade 1C)**.
3. For patients with acute SCI, the guideline developers recommend the optimal use of IPC and/or GCS if anticoagulant thromboprophylaxis is contraindicated because of high bleeding risk early after injury **(Grade 1A)**. When the high bleeding risk decreases, the guideline developers recommend that pharmacologic thromboprophylaxis be substituted for or added to the mechanical thromboprophylaxis **(Grade 1C)**.
4. For patients with an incomplete SCI associated with evidence of a spinal hematoma on computed tomography (CT) or magnetic resonance imaging (MRI), the guideline developers recommend the use of mechanical thromboprophylaxis instead of anticoagulant thromboprophylaxis at least for the first few days after injury **(Grade 1C)**.
5. Following acute SCI, the guideline developers recommend against the use of LDUH alone **(Grade 1A)**.
6. For patients with SCI, the guideline developers recommend against the use of an inferior vena cava filter as thromboprophylaxis **(Grade 1C)**.

7. For patients undergoing rehabilitation following acute SCI, the guideline developers recommend the continuation of LMWH thromboprophylaxis or conversion to an oral VKA (INR target, 2.5; range, 2.0 to 3.0) **(Grade 1C)**.

Burns

1. For burn patients who have additional risk factors for VTE, including one or more of the following: advanced age, morbid obesity, extensive or lower-extremity burns, concomitant lower-extremity trauma, use of a femoral venous catheter, and/or prolonged immobility, the guideline developers recommend routine thromboprophylaxis if possible **(Grade 1A)**.
2. For burn patients who have additional risk factors for VTE, if there are no contraindications, the guideline developers recommend the use of either LMWH or LDUH, starting as soon as it is considered safe to do so **(Grade 1C)**.
3. For burn patients who have a high bleeding risk, the guideline developers recommend mechanical thromboprophylaxis with GCS and/or IPC until the bleeding risk decreases **(Grade 1A)**.

Medical Conditions

1. For acutely ill medical patients admitted to hospital with congestive heart failure or severe respiratory disease, or who are confined to bed and have one or more additional risk factors, including active cancer, previous VTE, sepsis, acute neurologic disease, or inflammatory bowel disease, the guideline developers recommend thromboprophylaxis with LMWH **(Grade 1A)**, LDUH **(Grade 1A)**, or fondaparinux **(Grade 1A)**.
2. For medical patients with risk factors for VTE, and for whom there is a contraindication to anticoagulant thromboprophylaxis, the guideline developers recommend the optimal use of mechanical thromboprophylaxis with GCS or IPC **(Grade 1A)**.

Cancer Patients

1. For cancer patients undergoing surgical procedures, the guideline developers recommend routine thromboprophylaxis that is appropriate for the type of surgery **(Grade 1A)**. Refer to the recommendations in the relevant surgical subsections.
2. For cancer patients who are bedridden with an acute medical illness, the guideline developers recommend routine thromboprophylaxis as for other high-risk medical patients **(Grade 1A)**. Refer to the recommendations in the "Medical Conditions" section above.
3. For cancer patients with indwelling central venous catheters, the guideline developers recommend that clinicians not use either prophylactic doses of LMWH **(Grade 1B)** or mini-dose warfarin **(Grade 1B)** to try to prevent catheter-related thrombosis.
4. For cancer patients receiving chemotherapy or hormonal therapy, the guideline developers recommend against the routine use of thromboprophylaxis for the primary prevention of VTE **(Grade 1C)**.
5. For cancer patients, the guideline developers recommend against the routine use of primary thromboprophylaxis to try to improve survival **(Grade 1B)**.

Critical Care

1. For patients admitted to a critical care unit, the guideline developers recommend routine assessment for VTE risk and routine thromboprophylaxis in most **(Grade 1A)**.
2. For critical care patients who are at moderate risk for VTE (e.g., medically ill or postoperative general surgery patients), the guideline developers recommend using LMWH or LDUH thromboprophylaxis **(Grade 1A)**.
3. For critical care patients who are at higher risk (e.g., following major trauma or orthopedic surgery), the guideline developers recommend LMWH thromboprophylaxis **(Grade 1A)**.
4. For critical care patients who are at high risk for bleeding, the guideline developers recommend the optimal use of mechanical thromboprophylaxis with GCS and/or IPC at least until the bleeding risk decreases **(Grade 1A)**. When the high bleeding risk decreases, the guideline developers recommend that pharmacologic thromboprophylaxis be substituted for or added to the mechanical thromboprophylaxis **(Grade 1C)**.

Long Distance Travel

1. For travelers who are taking flights > 8 hours, the guideline developers recommend the following general measures: avoidance of constrictive clothing around the lower extremities or waist, maintenance of adequate hydration, and frequent calf muscle contraction **(Grade 1C)**.
2. For long-distance travelers with additional risk factors for VTE, the guideline developers recommend the general measures listed above. If active thromboprophylaxis is considered because of a perceived high risk of VTE, the guideline developers suggest the use of properly fitted, below-knee GCS, providing 15 to 30 mm Hg of pressure at the ankle **(Grade 2C)**, or a single prophylactic dose of LMWH, injected prior to departure **(Grade 2C)**.
3. For long-distance travelers, the guideline developers recommend against the use of aspirin for VTE prevention **(Grade 1B)**.

Definitions:

Grading Recommendation			
Grade of Recommendation*	**Benefit vs. Risk and Burdens**	**Methodologic Quality of Supporting Evidence**	**Implications**
Strong recommendation, high-quality evidence, Grade 1A	Desirable effects clearly outweigh undesirable effects, or *vice versa*	Consistent evidence from RCTs without important limitations or exceptionally strong evidence from observational studies	Recommendation can apply to most patients in most circumstances; further research is very unlikely to change our confidence in the estimate of effect
Strong recommendation,	Desirable effects	Evidence from RCTs with important	Recommendation can apply to most patients

Grading Recommendation			
Grade of Recommendation*	**Benefit vs. Risk and Burdens**	**Methodologic Quality of Supporting Evidence**	**Implications**
moderate-quality evidence, Grade 1B	clearly outweigh undesirable effects, or *vice versa*	limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence from observational studies	in most circumstances; higher quality research may well have an important impact on our confidence in the estimate of effect and may change the estimate
Strong recommendation, low or very low-quality evidence, Grade 1C	Desirable effects clearly outweigh undesirable effects, or *vice versa*	Evidence for at least one critical outcome from observational studies, case series, or from RCTs with serious flaws or indirect evidence	Recommendation can apply to most patients in many circumstances; higher-quality research is likely to have an important impact on our confidence in the estimate of effect and may well change the estimate
Weak recommendation, high-quality evidence, Grade 2A	Desirable effects closely balanced with undesirable effects	Consistent evidence from RCTs without important limitations or exceptionally strong evidence from observational studies	The best action may differ depending on circumstances or patient or society values; further research is very unlikely to change our confidence in the estimate of effect
Weak recommendation, moderate-quality evidence, Grade 2B	Desirable effects closely balanced with undesirable effects	Evidence from RCTs with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence from observational studies	Best action may differ depending on circumstances or patient or society values; higher-quality research may well have an important impact on our confidence in the estimate of effect and may change the estimate
Weak recommendation, low or very low-quality evidence, Grade 2C	Desirable effects closely balanced with undesirable	Evidence for at least one critical outcome from observational studies, case series, or from RCTs with serious flaws or	Other alternatives may be equally reasonable; higher-quality research is likely to have an important impact on our confidence in the

Grading Recommendation			
Grade of Recommendation*	**Benefit vs. Risk and Burdens**	**Methodologic Quality of Supporting Evidence**	**Implications**
	effects	indirect evidence	estimate of effect and may well change the estimate

*The guideline developers use the wording *recommend* for strong (Grade 1) recommendations and *suggest* for weak (Grade 2) recommendations.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- A vast number of randomized clinical trials over the past 30 years provide irrefutable evidence that primary thromboprophylaxis reduces deep vein thrombosis (DVT) and pulmonary embolism (PE), and there are studies that have also shown that fatal PE is prevented by thromboprophylaxis.
- Routine use of thromboprophylaxis reduces adverse patient outcomes while at the same time decreasing overall costs.

POTENTIAL HARMS

- For some patients, anticoagulant prophylaxis may increase the risk of bleeding.
- The use of low-dose unfractionated heparin (LDUH) is associated with a small increased risk of the limb- and life-threatening complication, heparin-induced thrombocytopenia (HIT).

CONTRAINDICATIONS

CONTRAINDICATIONS

- Current contraindications to the early initiation of anticoagulant thromboprophylaxis include the presence of intracranial bleeding, ongoing

and uncontrolled bleeding elsewhere, and incomplete spinal cord injury (SCI) associated with suspected or proven spinal hematoma.
- For patients with a history of heparin-induced thrombocytopenia (HIT), thromboprophylaxis with heparin or a low-molecular weight heparin (LMWH) should generally be avoided.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

Limitations of These Guideline Development Methods

Limitations of these guidelines include the limited quantity and quality of available studies for some patient groups. Second, it is possible that some authors followed this methodology more closely than others, although the development process was centralized by an evidence-based practice center (EPC) and supervised by the editors. Third, it is possible that the guideline developers missed relevant studies in spite of the comprehensive searching process. Fourth, despite their efforts to begin centralizing the methodologic evaluation of all studies to facilitate uniformity in the validity assessments of the research incorporated into these guidelines, resources were insufficient to conduct this evaluation for all but a few of the recommendations in each chapter. Fifth, the guideline developers performed only few statistical pooling exercises of primary study results. However, in the area of thromboprophylaxis, there are numerous pooling studies and meta-analyses which informed the recommendations if they were valid. Finally, sparse data on patient preferences and values represent additional limitations inherent to most guideline development methods.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

- The National Surgical Care Improvement Project (SCIP) utilizes the American College of Chest Physicians (ACCP) prophylaxis recommendations.
- The National Quality Forum (NQF)/The Joint Commission (TJC) use the ACCP prophylaxis guidelines to develop their National Patient Safety Goals.
- An implementation strategy includes local educational programs and tools (see below) offered through the ACCP Board of Governors and select other locations. The Veterans Administration (VA) will also participate in a pilot project on implementation of these ACCP prophylaxis guidelines.

IMPLEMENTATION TOOLS

Resources

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness
Staying Healthy

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Geerts WH, Bergqvist D, Pineo GF, Heit JA, Samama CM, Lassen MR, Colwell CW. Prevention of venous thromboembolism: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8th Edition). Chest 2008 Jun;133(6 Suppl):381S-453S. [728 references] PubMed

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2001 Jan (revised 2008 Jun)

GUIDELINE DEVELOPER(S)

American College of Chest Physicians - Medical Specialty Society

SOURCE(S) OF FUNDING

American College of Chest Physicians

GUIDELINE COMMITTEE

American College of Chest Physicians (ACCP) Expert Panel on Antithrombotic and Thrombolytic Therapy

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Dr. Geerts discloses that he has received grant monies from the Canadian Institutes for Health Research, Sanofi-Aventis, and Pfizer. He has received consultant fees from Bayer, Eisai, GlaxoSmithKline, Lilly, Merck, Pfizer, Roche, and Sanofi-Aventis, along with speakers honoraria from Bayer, Calea, Oryx, Pfizer, and Sanofi-Aventis.

Dr. Bergqvist discloses that he has received grant monies from the Swedish Research Council and the Heart and Lung Foundation. He has also served on advisory committees for AstraZeneca, Pfizer, Boehringer Ingelheim, and Sanofi-Aventis.

Dr. Colwell discloses that he received grant monies from the Aircast Foundation and the National Institutes of Health. He received consultant fees from AstraZeneca, Sanofi-Aventis, and Eisai, and has served on advisory committees for Wyeth-Ayerst. Dr. Colwell also received research funding from Boehringer Ingelheim, Bayer Healthcare, and Stryker.

Dr. Heit reveals no real or potential conflicts of interest or commitment.

Dr. Lassen discloses that he has received consultant fees from AstraZeneca, Bristol-Myers Squibb, Pfizer, Sanofi-Aventis, Astellas, and Bayer. He is also on the advisory committees of AstraZeneca, Bristol-Myers Squibb, Pfizer, Sanofi-Aventis, Astellas, Bayer, GlaxoSmithKline, Boehringer Ingelheim, and Besst-test.

Dr. Samama discloses that he has received grant monies from Novo Nordisk, Sanofi, and Pfizer. He has received consultant fees from Pfizer. Dr. Samama has served on the speakers bureau of Boehringer Ingelheim and Sanofi, and has assisted advisory committees of BMS, AstraZeneca, Bayer, GlaxoSmithKline, and Mitsubishi.

Dr. Pineo discloses that he has received consultant fees from Sanofi-Aventis, BMS, Daiichi Sankyo, and Telecvis. He is involved with the speakers bureaus of Sanofi-Aventis, Leo, and Pfizer. Dr. Pineo assists the advisory committees of Sanofi-Aventis, Pfizer, Telecvis, Leo, and Bayer.

ENDORSER(S)

American College of Clinical Pharmacy - Medical Specialty Society
American Society of Health-System Pharmacists - Professional Association

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Geerts WH, Pineo GF, Heit JA, Bergqvist D, Lassen MR, Colwell CW, Ray JG. Prevention of venous thromboembolism: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest 2004 Sep;126(3 Suppl):338S-400S.

GUIDELINE AVAILABILITY

Electronic copies: Available to subscribers of the Chest - The Cardiopulmonary and Critical Care Journal.

Print copies: Available from the American College of Chest Physicians, Products and Registration Division, 3300 Dundee Road, Northbrook IL 60062-2348.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

Executive Summary:

- Antithrombotic and thrombolytic therapy executive summary. Chest 2008 Jun; 133:71S-109S.

Background Articles:

- Antithrombotic and thrombolytic therapy. Chest 2008 Jun; 133:110S-112S.

- Methodology for antithrombotic and thrombolytic therapy guideline development. Chest 2008 Jun; 133:113S-122S.
- Grades of recommendation for antithrombotic agents. Chest 2008 Jun; 133:123S-131S.
- Strategies for incorporating resource allocation and economic considerations. Chest 2008 Jun; 133:132S-140S.

Electronic copies: Available to subscribers of the Chest - The Cardiopulmonary and Critical Care Journal.

Print copies: Available from the American College of Chest Physicians, Products and Registration Division, 3300 Dundee Road, Northbrook IL 60062-2348.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on July 12, 2001. The information was verified by the guideline developer on September 27, 2001. This summary was updated by ECRI on December 28, 2004. The updated information was verified by the guideline developer on January 12, 2005. This summary was updated by ECRI Institute on June 22, 2007 following the U.S. Food and Drug Administration (FDA) advisory on heparin sodium injection. This summary was updated by ECRI Institute on March 14, 2008 following the updated FDA advisory on heparin sodium injection. This summary was updated by ECRI Institute on November 24, 2008. The updated information was verified by the guideline developer on January 7, 2009.

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